



*K. Sambath*

# Avinashilingam Institute for Home Science and Higher Education for Women

(Deemed to be University Estd. u/s 3 of UGC Act 1956, Category 'A' by MHRD)  
Re-accredited with 'A++' Grade by NAAC. Recognised by UGC Under Section 12B  
Coimbatore - 641 043, Tamil Nadu, India

Bachelor's Degree Examination – November 2024

III Semester

Class : II UG

Major : Computer Applications

Time: 3 Hours

Max. Marks: 100

## 23BCAC05 Operating Systems

### Course Outcomes:

**CO1:** Recall the concepts of file management.

**CO2:** Apply security aspects in appropriate situations.

**CO3:** Apply knowledge gained through processor scheduling to other applications

**CO4:** Analyze features and limitations of operating systems.

**CO5:** Explore various other operating systems.

### Part A

10 x 1 = 10

### Choose the Correct Answer

- Which of the following is a valid state in the Process State Transition model? CO1 K1
  - Running
  - Executed
  - Terminated
  - Suspended
- In the context of parallel processing, what is a semaphore used for? CO1 K2
  - Memory management
  - Mutual exclusion
  - Process scheduling
  - File handling
- Which of the following belongs to the storage hierarchy? CO2 K1
  - CPU
  - Registers
  - Cache
  - Disk controller
- What is the primary function of paging in memory management? CO2 K2
  - To prevent memory fragmentation
  - To protect memory from unauthorized access
  - To divide the physical memory into blocks of equal size
  - To allow direct access to the virtual memory handling
- Which scheduling algorithm selects the process with the shortest remaining time for execution? CO3 K1
  - Round Robin Scheduling
  - First-In-First-Out Scheduling
  - Shortest Job First Scheduling
  - Shortest Remaining Time Scheduling
- Which of the following is a key characteristic of fault-tolerant multiprocessing systems? CO3 K2
  - Lower response time
  - Redundancy in hardware
  - Use of a single processor
  - Simple interconnection schemes
- Which of the following is NOT a condition necessary for deadlock to occur? CO4 K1
  - Mutual exclusion
  - Hold and wait
  - Preemption
  - Circular wait
- Which of the following is a primary function of a file system? CO4 K2
  - Processor scheduling
  - File organization
  - Deadlock detection
  - Semaphore handling
- Which of the following is a common user authentication method used in operating systems? CO5 K1
  - Paging
  - Password-based authentication
  - Virtual memory
  - File encryption
- What does an Access Control List (ACL) specify in an operating system? CO5 K2
  - The users and processes that can access system memory
  - The level of security required by the system
  - The permissions granted to each user for a specific object
  - The order of processes in the scheduling queue

**Part B**

**5 x 6 = 30**

**Answer ALL questions**

**Each answer should not exceed 400 words or two pages**

- 11.a. What is a Process Control Block (PCB) and what are its key components? CO1 K1  
(or)
- 11.b. Describe parallel processing and explain its significance in modern operating systems. CO1 K1
- 12.a. What is the concept of storage hierarchy? Explain its different levels with examples. CO2 K2  
(or)
- 12.b. Illustrate the working of paging technique. How does the operating system handle page faults and optimize storage access? CO2 K2
- 13.a. Demonstrate the Round Robin Scheduling algorithm. How does it differ from First-In-First-Out (FIFO) scheduling? CO3 K3  
(or)
- 13.b. Define multiprocessing and show how fault tolerance is achieved in multiprocessing systems. CO3 K3
- 14.a. Analyze the necessary conditions for a deadlock to occur. CO4 K4  
(or)
- 14.b. Compare the different types of database models. CO4 K4
- 15.a. Determine the basic principles of operating system security design. CO5 K3  
(or)
- 15.b. What is a protection domain, and how does the access control list work to ensure system security? CO5 K3

**Part C**

**5 x 12 = 60**

**Answer ALL questions**

**Each answer should not exceed 800 words or four pages**

- 16.a. Examine the operations of Operating Systems and explain the different states in a process state transition diagram. CO1 K1  
(or)
- 16.b. Discuss the concept of Mutual Exclusion and explain how semaphores help in handling the critical section problem. CO1 K2
- 17.a. Discuss the various storage management strategies used in operating systems. How does the operating system handle real and virtual storage? CO2 K2  
(or)
- 17.b. Differentiate between Paging and Segmentation in virtual storage systems. CO2 K2
- 18.a. Compare and contrast scheduling algorithms such as Shortest Job First (SJF), Shortest Remaining Time(SRT), and Highest Response Ratio Next (HRRN). Which is most efficient and why? CO3 K4  
(or)
- 18.b. Discuss the architecture and organization of multiprocessor operating systems. How do array processors and dataflow computers contribute to parallel processing? CO3 K4
- 19.a. Consider a system with five processes P0 through P4 and three resource types A, B, C. Resource type A has 7 instances, resource type B has 2 instances and resource type C has 6 instances. At time T0, the following snapshot has been taken.

Processes	Allocation(ABC)	Maximum(ABC)	Available(ABC)
P0	0 1 0	000	000
P1	2 0 0	202	
P2	3 0 3	000	
P3	2 1 1	100	
P4	0 0 2	002	

Find out the process sequence to enter into deadlock state. (Use deadlock detection algorithms.) CO4 K4

(or)

- 19.b. Explain the functions of a file system in an operating system. How does file management ensure data integrity and security? CO4 K4
- 20.a. Discuss different user authentication techniques used in modern operating systems. How do these techniques help in securing the system? CO5 K4  
(or)
- 20.b. Compare the security and protection mechanisms of Linux and Windows operating systems. Which system provides better security, and why? CO5 K4